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BIOTA OF FRESHWATER ECOSYSTEMS. IDENTIFICATION MANUAL NO. 4. FRESHWATER POLYCHAETES (ANNELIDA) OF NORTH AMERICA

Nancy Foster

Smithsonian Institution
Washington, D. C.

March 1972

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Identification Manual No. 4

FRESHWATER POLYCHAETES (ANNELIDA) OF NORTH AMERICA

by

Nancy Foster
Chairman, Department of Biology
Dunbarton College
Washington, D.C. 20008

for the

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FOREWORD

"Freshwater Polychaetes (Annelida) of North America" is the fourth of a series of identification manuals for selected taxa of invertebrates occurring in freshwater systems. These documents prepared by the Oceanography and Limnology Program, Smithsonian Institution for the Environmental Protection Agency will contribute toward improving the quality of the data upon which environmental decisions are based.

Additional manuals will include, but not necessarily be limited to, freshwater representatives of the following groups: amphipod crustaceans (Gammaridae), branchiuran crustaceans (*Argulus*), isopod crustaceans (Asellidae), decapod crayfish crustaceans (Astacidae), leeches (Hirudinea), freshwater planarians (Turbellaria), aquatic dryopoid beetles (Dryopoidea) and freshwater clams (Sphaeriacea).

ABSTRACT

Eight species of freshwater polychaetes are reported in the form of a key. Three families are represented: Nereidae with six species; Sabellidae with one species; Serpulidae with one species. The key includes only those polychaetes actually collected from freshwater and not those reported to withstand low salinities under experimental laboratory situations. Collection and preservation methods are discussed as well as characters used in specific identification.

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SECTION I

INTRODUCTION

It is obvious from the number of species represented in this key that very little is known about North American freshwater polychaetes. The number of freshwater species in the world is quite small when compared with the vast number of marine species. There are several marine forms which have penetrated brackish and fresh water but remain unable to breed there while others have adapted sufficiently to remain for their entire life span. Of the some 60 polychaete families, only seven have been reported as having freshwater representatives. These are the Nereidae, Nephthyidae, Lumbrineridae, Spionidae, Capitellidae, Ampharetidae, Sabellidae and Serpulidae (Wesenberg-Lund, 1958). The largest number of freshwater species are of the families Nereidae and Sabellidae, the others having fewer than five representatives. All freshwater representatives are from well established marine families and have not required the establishment or any taxon higher than genus. The Nereidae, with the largest number of freshwater species, are known for their ability to withstand extreme salinity changes and have been widely used as experimental animals in salinity tolerance work. This paper is not concerned with those worms reported to withstand fresh water in the laboratory, but only with those actually collected from fresh water. Some of the species included in this paper are strictly freshwater forms while others are euryhaline.

Of the known freshwater species, the majority are from South America and Asia with only a small proportion having been collected in North America. There have been several papers dealing with freshwater polychaete species and comprehensive surveys were made by Wesenberg-Lund (1958), Southern (1921) and Stammer (1932). It is very probable that there are many more species present and that our lack or knowledge is due to their small size and to the scarcity of collections made with polychaetes in mind as well as the scarcity of specialists willing to work with them. Eight species, representing six genera are included in this paper. Several species are in monotypic genera but the majority are in typical marine genera. The species list in this paper includes three families: Nereidae with six species; Sabellidae with one species; Serpulidae with one species.

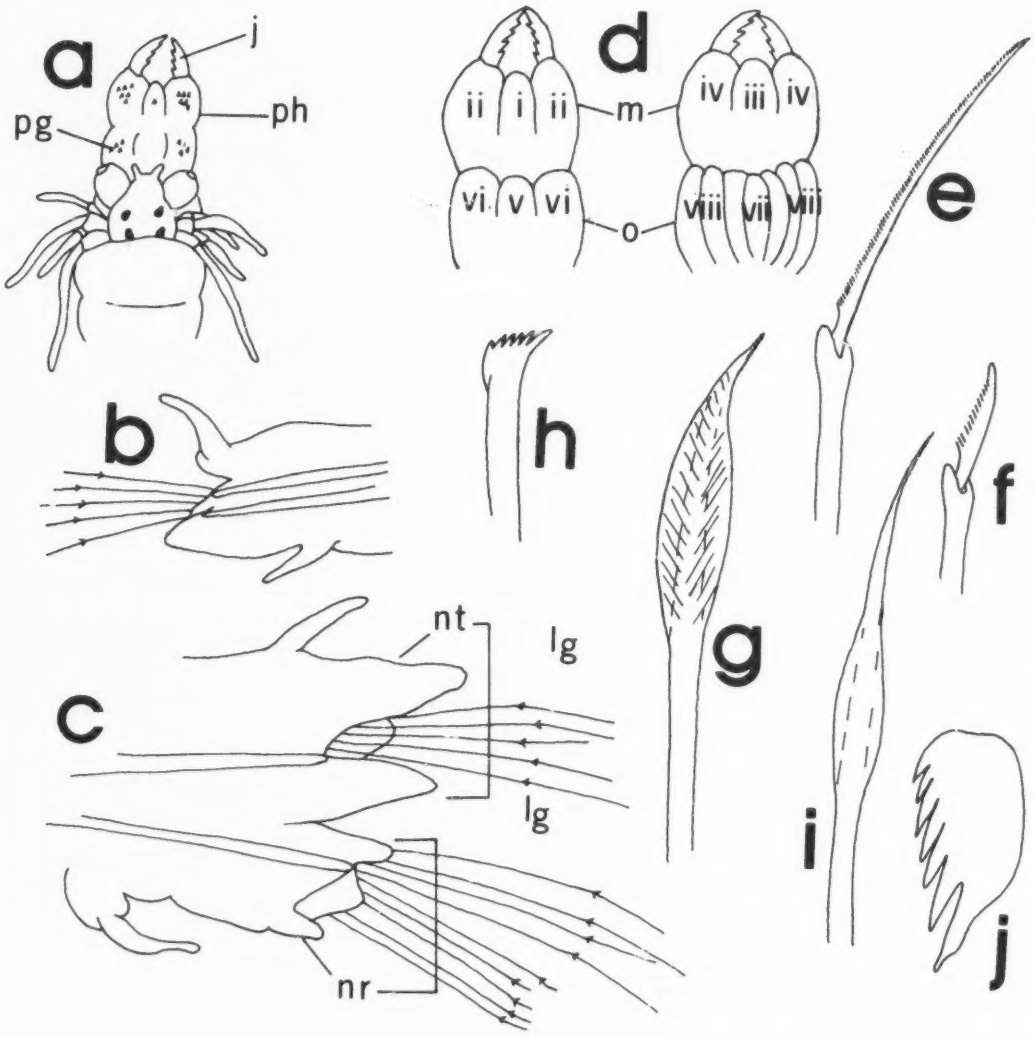

Fig. 1. Taxonomic characters used in identification of North American freshwater polychaetes. Nereidae a-f: a- Dorsal view anterior end with proboscis everted; b- Uniramous parapodium; c- Biramous parapodium; d- Pharynx, dorsal and ventral views; e- Spiniger; f- Falciger. Sabellidae g-h: g- Capillary seta; h- Hook. Serpulidae i-j: i- Capillary seta; j- Hook.
nt-notopodium; nr-neuropodium; lg-ligules; ph-pharynx; j-jaw; pg-paragnath; o-oral ring; m-maxillary ring.

COLLECTING AND PRESERVATION

Freshwater species are collected in much the same manner as marine forms. Those from shore areas and shallow water are collected with a shovel and a fine sieve. The sediment is placed in the sieve, washed through and the remaining animals then removed. Those from deeper water may be collected by dredging or by the use of grab samplers the sediment from which is then washed through a fine sieve.

Polychaetes should be initially preserved in 10% formalin and subsequently transferred to 70% ethyl alcohol. As usual, whenever possible observations should be made on the living animal noting such things as coloration, presence of eyes etc. as these may possibly change or disappear in the preservatives.

IDENTIFICATION

Essentials for identification are a dissecting microscope, compound microscope, micro-dissecting scissors, micro-forceps, slides and cover slips. In some instances, fine needles are beneficial. Glycerin serves as a satifactory temporary mounting medium and glycerin jelly for more permanent mounts. If the setae and/or parapodia need to be examined, the parapodia should be removed and viewed on a slide under the compound microscope.

The following is a discussion of characters used in the identification of North American species. A nereid is a typical errant polychaete with a well developed prostomium, sensory appendages and often with eyes (Fig. 1a). The parapodia are also well developed and may be uniramous (Fig. 1b) with one setigerous lobe or biramous (Fig. 1c) with two lobes. In biramous parapodia the dorsal lobe is the notopodium and the ventral lobe the neuropodium with the various subdivisions of these lobes referred to as ligules (*see* Fig. 1c). The term setiger refers to any setae-bearing segment. Nereids possess an eversible pharynx armed with jaws and conical projections called paragnaths (*see* Fig. 1c). The pharynx may also be smooth or bear soft papillae. The arrangement of these paragnaths and papillae is characteristic for each species and the pharynx is divided into two rings, the oral ring surrounding the mouth and the maxillary ring where the jaws are inserted. These two rings are in turn subdivided into areas where the paragnaths are located. The areas are designated by Roman numerals (Fig. 1d). Setae are compound spinigers with thin, tapering blades or falcigers with short blunt blades (Fig. 1e, f). In the Sabellidae and Serpulidae, which are sedentary forms, the body is divided into two regions with pronounced differences in the parapodia and setae. Parapodia are reduced and not elaborately developed as in the nereids. The setae are simple capillaries and hooks (Fig. 1g-j). The anterior end is modified to form a branchial plume or crown which is used for food getting and respiration (Fig. 2).

SECTION II

SPECIES LIST AND RANGES

Nereidae

Laeonereis culveri (Webster, 1879). Eastern coast brackish water and freshwater tributaries.

Lycastoides alticola Johnson, 1903. Sierra Laguna, California; mountain stream.

Lycastopsis hummelincki Augener, 1933. West Florida coast brackish water and freshwater tributaries.

Namanereis hawaiiensis (Johnson, 1903). Southern California freshwater pond.

Nereis limnicola Johnson, 1903. Lake Merced, San Francisco, California north to Coos Bay, Oregon.

Nereis succinea Frey and Leuckart, 1847. Cosmopolitan east and west coasts brackish to fresh water.

Sabellidae

Manyunkia speciosa Leidy, 1858. Lake Erie; Lake Superior; Schuylkill River Fairmont, Philadelphia; Egg Harbor River, New Jersey.

Serpulidae

Mercierella enigmatica Fauvel, 1922. Lake Merritt, Oakland, California; tributaries, Gulf of Mexico. Fresh, brackish and marine waters.

The above distributions are limited to North America even though many of the species are found in other parts of the world.

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SECTION III

KEY TO THE NORTH AMERICAN FRESHWATER POLYCHAETA

1 Anterior end of body modified to form branchial crown of filaments surrounding the mouth (Fig. 2a, b). Prostomium reduced. Parapodia reduced; with simple capillary setae and hooks. Sedentary 2

Anterior end of body without branchial crown. Prostomium well developed usually with eyes and sensory appendages (Fig. 2c). Parapodia well developed; usually with compound as well as simple setae. Errant..... 3

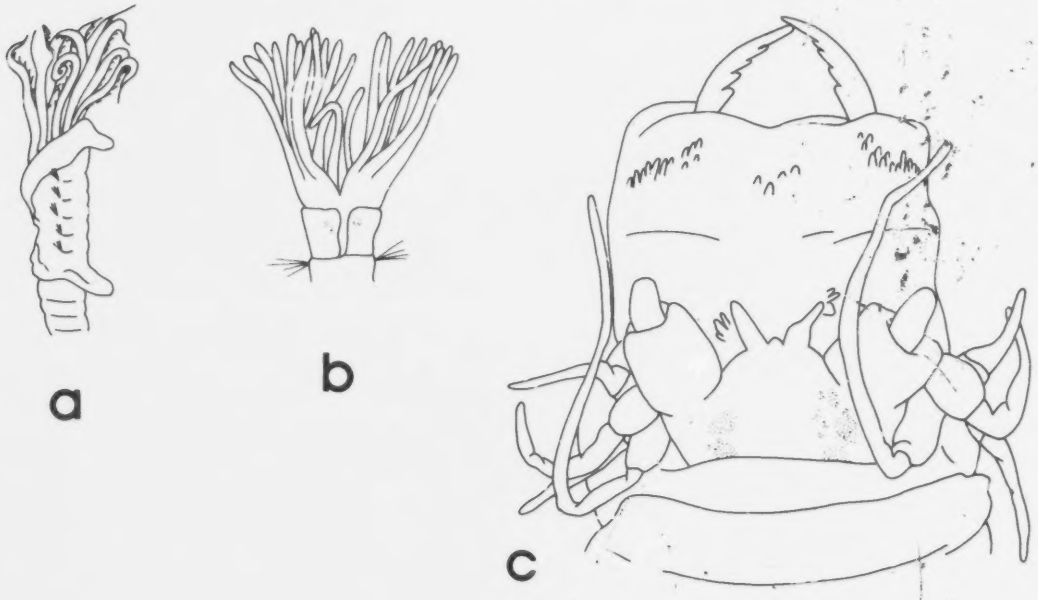

Fig. 2. a- *Mercierella enigmatica*, lateral view anterior end; b- *Manyunkia speciosa*, dorsal view anterior end; c- *Nereis limnicola*, dorsal view anterior end.

2(1) Branchial crown with stalked operculum showing considerable degree of variability (Fig. 3a-c). Thoracic region with well defined collar (*see* Fig. 2a). With calcareous tube: *Mercierella enigmatica*

Branchial crown without stalked operculum. Thorax lacking collar (Fig. 2b). Tube membranous or sandy: *Manyunkia speciosa*

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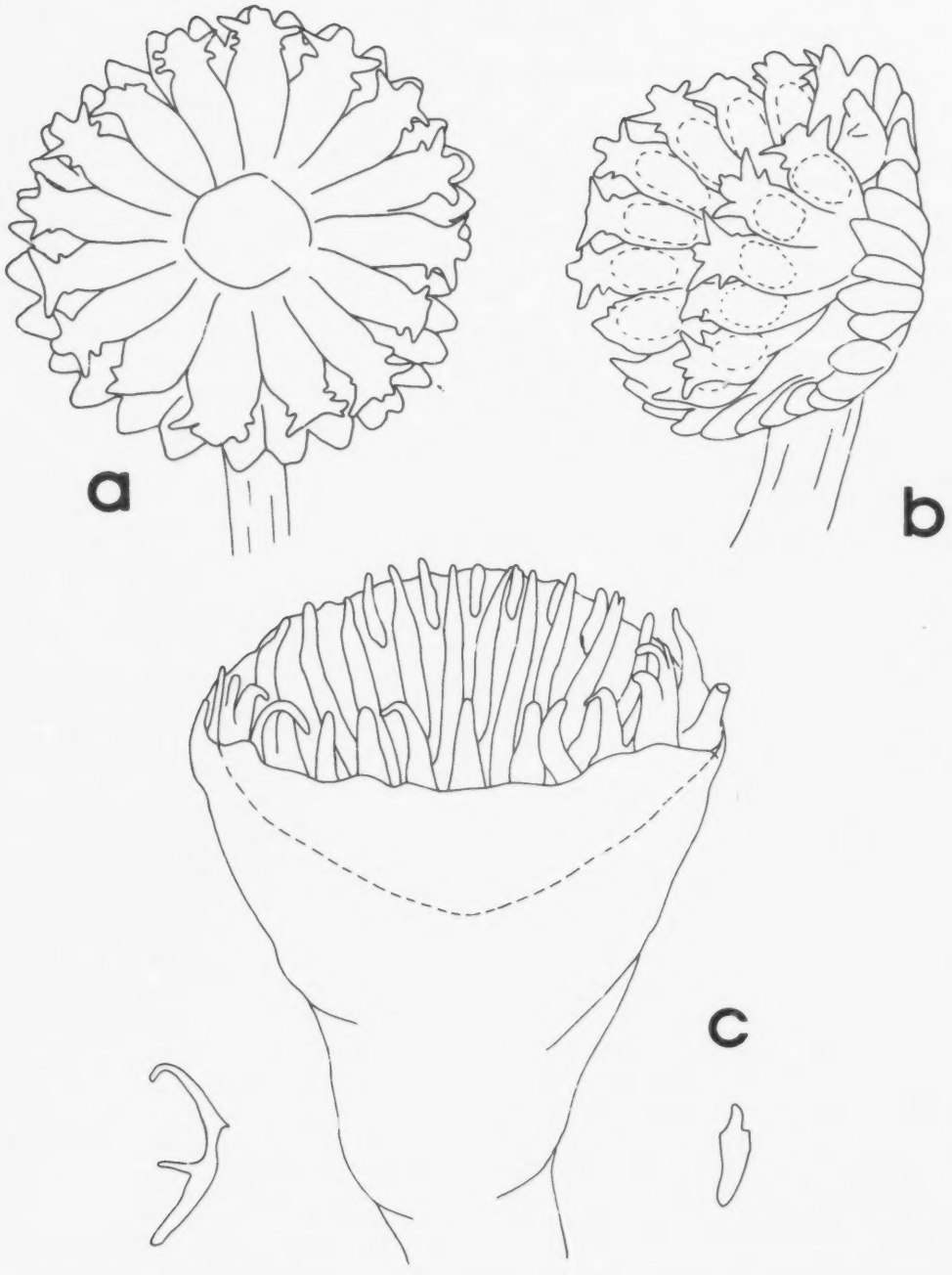

Fig. 3. *Mercierella enigmatica*: a- Dorsal view operculum; b- Dorsolateral view operculum; c- Lateral view operculum showing two individual teeth.

3(1) Eversible proboscis with few to many paragnaths on both maxillary and oral rings. With prostomial eyes (Fig. 2c)..... 4
Eversible proboscis without paragnaths; with or without papillae. With or without prostomial eyes 5

4(3) Parapodia biramous; well developed. Posterior dorsal notopodial lobes much enlarged and often foliaceous (Fig. 4a). Proboscis area VI with 7-15 paragnaths; area V with 2-5. Neuropodial falcigers only; with straight blades (Fig. 4b):
Nereis succinea

Parapodia biramous; well developed but without enlarged posterior notopodial lobe (Fig. 4c). Proboscis area VI with 3-4 small paragnaths; area V with none (*see* Fig. 2c). Neuropodial falcigers only; similar to those of *N. succinea*:
Nereis limnicola

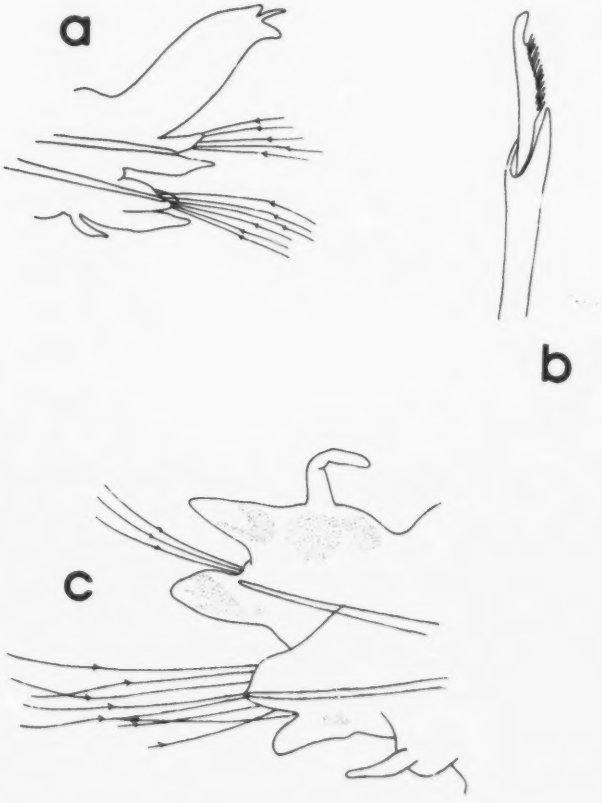

Fig. 4. a- *Nereis succinea*, anterior view posterior parapodium; b- *N. succinea*, posterior falciger; c- *N. limnicola*, posterior view posterior parapodium.

5(3) Parapodia biramous; with number of lobes reduced in posterior setigers (Fig. 5a-b). Proboscis with groups of soft papillae:
Laeonereis culveri

Parapodia uniramous 6

6(5) Prostomium not bilobed; without eyes. With 3 pairs of tentacular cirri. Proboscis without papillae; with elevated pads on dorsal side of basal ring: *Lycastopsis hummelincki*
Prostomium bilobed. With 4 pairs of tentacular cirri 7

7(6) With tentacular cirri generally uniform in length; short, tapering. With eyes. Falcigers with long, smooth tips (Fig. 5c): *Namanereis hawaiiensis*
With tentacular cirri which appear articulated; not uniform in length (Fig. 5d). Without eyes: *Lycastoides alticola*

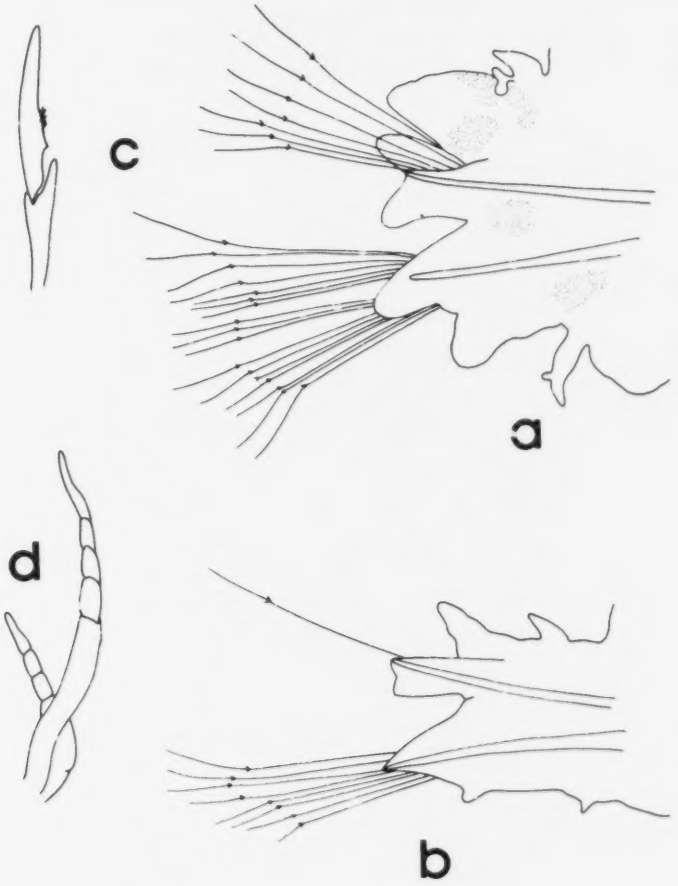

Fig. 5. a- *Laeonereis culveri*, posterior view anterior parapodium; b- *L. culveri*, posterior view posterior parapodium; c- *Namanereis hawaiiensis*, posterior falciger; d- *Lycastoides alticola*, tentacular cirri.

SECTION IV

ACKNOWLEDGEMENTS

I wish to thank the Smithsonian Institution, Division of Worms, for the use of the polychaete collections.

SECTION V

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